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## Prairie Dogs and the Prairie Ecosystem

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# Prairie Dogs and the Prairie Ecosystem



Black-tailed prairie dog

If you have ever traveled in the Great Plains of North America, you probably noticed squirrel-like animals scampering about the prairie among large mounds of soil. The French explorers called these animals “little dogs” because of the barking sounds they make, but they are actually rodents that belong to the squirrel family. Today, they are known as “prairie dogs” and they are one of the most adored and most despised animals in the United States.

Prairie dogs are native to the Great Plains and southwestern desert grasslands of the United States and extend into the plains and plateaus of Canada and Mexico. They play an important ecological role in the short- and mixed-grass prairies and desert grasslands. The area in which prairie dogs occur typically contains much shorter vegetation than the surrounding area. These open patches act as crossroads of the prairie, encouraging a variety of plants and animals that differ in species and number from the surrounding grasslands. Some of the animals, such as black-footed ferrets and burrowing owls are endangered or declining because fewer prairie dogs remain to create and maintain these unique patches of habitat.

Lewis and Clark, while on their famous expedition up the Missouri River in 1804, were first among the explorers to document this “wild dog of the prairie.” In 1919, E. W. Nelson, Chief of the Bureau of Biological Survey, estimated that prairie dogs inhabited about 100 million acres in the United States. The largest prairie dog colony on record, in Texas, measured 100 miles wide and 250 miles long, and contained an estimated 400 million prairie dogs!

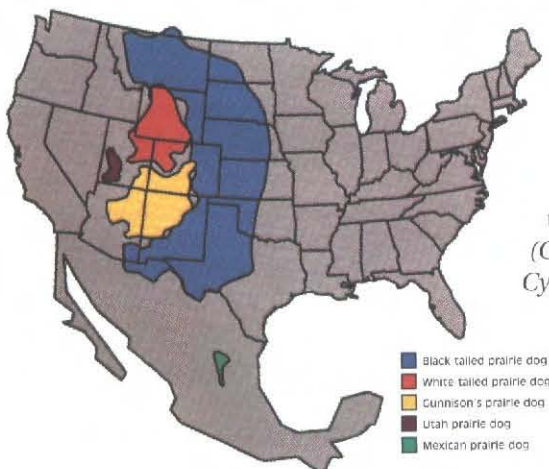
The diaries of westward-bound pioneers include accounts of the local abundance and humorous antics of these small prairie residents. Prairie dogs lost their comic appeal, however, when settlers observed them feeding on their crops and grasslands used by livestock. The conflict between prairie dogs and land-use interests has continued into the 21st century. Widespread habitat loss through tillage and land development, die-offs from a disease called plague, and efforts to poison prairie dogs have resulted in dramatic reductions in the number of prairie dogs throughout much of the Great Plains and southwestern desert grasslands.

Black-tailed prairie dogs still occupy more than one million acres of grasslands, but this represents only a small percentage of their historic distribution.

## Prairie dog particulars

Five species of prairie dogs are found in North America: the black-tailed (*Cynomys ludovicianus*), Mexican (*C. mexicanus*), white-tailed (*C. leucurus*), Gunnison's (*C. gunnisoni*), and Utah (*C. parvidens*) prairie dog. *Cynomys* means “dog-mouse,” which characterizes this group of rodents with the dog-like bark. The black-tailed prairie dog, as its name indicates, has a black-tipped tail, weighs about one to three pounds, and is about 10 to 16 inches long. The black-tailed prairie dog is the most abundant and widely distributed species of prairie dog. They occur across the Great Plains from southern Canada to northern

Distribution of prairie dogs in North America







*Young black-tailed prairie dogs*

have white-tipped tails. White-tailed prairie dogs live in arid grasslands and shrub-grasslands from 5,000 to 10,000 feet. They are about the same size as black-tailed prairie dogs, although females are considerably smaller than males. Gunnison's prairie dog, the smallest of the five species, inhabits open grassy and brushy areas from 6,000 to 12,000 feet. The Utah prairie dog is a threatened species and is currently limited to central Utah. Although several differences occur among the species, we will refer to the black-tailed prairie dog for examples in the remainder of this publication.

## **The active life of a prairie dog**

Black-tailed prairie dogs are social animals that live in colonies or "towns," most of which range in size from one to 1,000 acres. Larger towns are often divided into wards by barriers such as ridges, treelines, and roads. Within a ward, each family or "coterie" of prairie dogs occupies a territory of about one acre in size. A coterie usually consists of a single adult male, one to four adult females, and related yearlings and juveniles. Movement among wards is uncommon except during the late spring when juvenile males disperse from their natal coterie.

One of the most obvious features of a prairie dog colony is the abundance of mounds and holes. Colonies of black-tailed prairie dogs have from 10 to 100 burrow entrances per acre. Each burrow entrance leads to a tunnel that is usually 6 to 15 feet deep and 15 to 30 feet long, although the size and complexity of burrows vary greatly. Prairie dogs often dig small chambers just below the surface, where they sit and listen for aboveground activity. Females make nest chambers several feet belowground where they sleep and care for their young. Prairie dogs construct dome- and volcano-shaped mounds that are one to three feet high and three to ten feet in diameter with the soil that they excavate from their tunnels. The mounds serve as lookout stations, prevent water from entering their tunnels, and promote passive ventilation of the burrows. Burrowing can be beneficial to the soil because it results in the mixing of soil types, incorporation of organic matter, increased soil aeration, and decreased compaction.

Prairie dogs are active during the day, rising with the sun and retreating to their burrows around sunset. In the summer, prairie dogs feed mostly in the early morning and late afternoon. During the hottest part of the day, they go belowground where it is much cooler. Black-tailed prairie dogs are active year-round, but may stay underground for several days during severe winter weather. On sunny winter afternoons, they come out to forage and bask in the sun's warmth.

In addition to feeding and maintaining their burrows, black-tailed prairie dogs must also guard their territories from unrelated prairie dogs. An interloper that trespasses in the territory of another coterie may be charged by a resident. If the intruder is just searching for food or exploring, it will usually retreat after this first charge. The trespasser may not be so inclined to leave, however, if it is attempting to acquire mates or expand its territory. In such cases, the dominant male from the invaded coterie and the intruder will engage in a territorial dispute. The dispute involves some serious staring, tooth chattering, flaring of the tail, and bluff charges, but only limited physical contact usually occurs. Aggressive males, however, may fight to take over a new territory. The victor establishes himself as the dominant male of the coterie

Mexico and from the foothills of the Rocky Mountains eastward to about the 98th Meridian, usually at elevations below 6,000 feet. Although still locally abundant, their numbers have declined dramatically during the past century. The black-tailed prairie dog is now a candidate for listing as a threatened species under the U.S. Endangered Species Act. The endangered Mexican prairie dog also has a black-tipped tail, but is smaller than its northern relative and occurs only in Mexico. White-tailed, Gunnison's, and Utah prairie dogs all



and the loser retreats from the area. Dispersing males may replace older, less fit males and by moving among coterie, prevent inbreeding in the population.

## Communication is the key

One of the most fascinating aspects of prairie dog behavior is the way they communicate. Black-tailed prairie dogs have at least 12 distinct calls and a variety of postures and displays. While foraging, prairie dogs frequently lift their heads or stand on their hind legs to survey their surroundings. When a prairie dog detects danger, such as a coyote, it retreats to a burrow mound and gives a series of short nasal yips as a warning. Prairie dogs that are nearby will stop what they are doing, stand on their hind legs, and look for the source of danger. If they spot a coyote, they will run and dive into their burrows or perch atop their burrow mounds and join in the “barking” chorus. In time, the prairie dogs that went underground will cautiously emerge from their burrows. Their large eyes and inconspicuous ears are set high on their heads, enabling them to examine the area without leaving the safety of their burrows. When the predator has departed, prairie dogs will emerge from their burrows and give “jump-yip” calls to indicate safety to the other prairie dogs.

Members of a coterie are very sociable and maintain unity through physical contact. When two coterie members meet, they often make open mouth-to-mouth contact. This “kiss” is used to distinguish a coterie member from a stranger. An intruder will often leave the area when faced by a resident with bared teeth. Coterie members, on the other hand, recognize and accept each other’s presence. Following the “kiss,” members often partake in elaborate grooming. All coterie members groom each other: the young, in particular, are quite persistent in seeking attention from the adults.

## Life and death in a prairie dog town

Most black-tailed prairie dogs reach sexual maturity after their second winter. In the southern portion of their range, they breed as early as January, while the breeding season does not begin until late March in northern areas. Black-tailed prairie dogs breed only once a year and their gestation period is about 35 days. Litters usually include four to six pups. The young are born naked, blind, and helpless and remain underground for the first five to six weeks of their lives. Most pups in the central plains emerge from their dens in May and are weaned shortly thereafter. Survival of young prairie dogs is about 50%, which is high compared to many other rodents. Life in a prairie dog town provides the benefits of a relatively safe underground home and warnings of danger by the many individuals that are watching over the town. Ironically, the pups are occasionally killed and eaten by related female prairie dogs. Infanticide has been found to be a major cause of mortality in some colonies.

Females usually spend their entire lives in their original coterie, while young males often move away in late spring when they are about 14 months old. Some move to adjacent coterie, while others travel up to five miles before establishing new territories. Dispersal is risky business and many young prairie dogs die during this time as they leave the safety of their coterie and well-established burrows.

In the wild, female prairie dogs usually live three to five years. Males have a shorter lifespan, because of their demanding territorial behavior. Even with their communal and underground lifestyle, predation is still a major cause of mortality. Badgers are a serious threat because they can dig deep into prairie dog burrows. With their streamlined bodies, black-footed ferrets can prowl through and capture prairie dogs in their burrows. Occasionally they



*Prairie dog communication—the “jump-yip” call*



*Common predators of prairie dogs*



## Prairie Dogs and Their Ecosystem







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dig prairie dogs out of their burrows, leaving a characteristic ramp of soil near the burrow entrance. Other predators, such as coyotes, bobcats, and swift foxes, must rely on their ability to stalk prairie dogs that are feeding on the outskirts of a town. Golden eagles regularly soar over towns in search of unsuspecting prairie dogs. Ferruginous hawks wait near mounds and capture prairie dogs as they emerge from their burrows. Prairie rattlesnakes and bull snakes may take some young, but are not a great threat to adult prairie dogs.

Prairie dogs are susceptible to several diseases, of which plague is the most notable. Plague is caused by the bacterium *Yersinia pestis*, which was unintentionally introduced to the United States in the late 1800s. Prairie dogs have little or no natural resistance to plague, so it is devastating in populations, leading to the rapid decline and even disappearance of entire colonies. It is transmitted by the bite of an infected flea or by direct and aerosol contact among prairie dogs. Plague is considered to be a major threat to all species of prairie dogs in the United States and is one of the reasons that the black-tailed prairie dog has been considered for listing as a threatened species. Other mortality factors that affect prairie dogs include accidents, competition, starvation, and weather, but human activities have caused the greatest decline in populations.

## Human health concerns

Plague can be transmitted to humans by the bite of an infected flea or by handling infected animals. Also known as "black death," it was responsible for the loss of one-third of the human population in Europe in the 1300s, before the advent of modern medicine and hygiene. During the past decade, 10 to 15 cases of human plague have occurred each year in the United States, of which 13% were attributed to contact with prairie dogs or their fleas. Symptoms often resemble those of the flu, including chills, fever, and swollen lymph nodes. The disease is curable in humans if diagnosed and treated in its early stages. The risk of contracting plague from prairie dogs is small. Awareness and avoidance are the keys to protecting you and your family from exposure.

Two other threats to humans in prairie dog towns are rattlesnakes and black widow spiders. Both are quite secretive and avoid contact with humans when given the chance, but they can deliver painful and potentially dangerous bites if threatened or disturbed. Rattlesnakes often rest in prairie dog burrows during the day and move through towns at night in search of food. Black widow spiders are most often found in abandoned or infrequently used prairie dog holes where they form a web and have their young. Bites from these animals are rare. You can safely enjoy exploring prairie dog towns if you use a little caution.



*Prairie dogs feed on grasses and forbs*

## Plants and prairie dogs

Prairie dogs spend much of their time aboveground eating and looking for plants to eat. They primarily eat grasses, forbs, and sedges that are present within their territory. Grasses make up most of a prairie dog's diet on a grass-dominated prairie dog town. Forbs, however, become more prominent in their diet during the fall as green grasses become scarce. They also clip tall plants to allow a better view of predators in their area. In preparation for colder weather, prairie dogs eat seeds and occasionally insects that are high in fat and protein. In the winter, black-tailed prairie dogs will eat any available parts of plants, especially the roots.

A prairie dog may eat only about five percent of its body weight in plants each day, but in dense colonies during the summer, they can easily eat over 75 pounds of forage per acre each month. The ability of a plant species to survive in a prairie dog town depends on how well it can withstand the activities of prairie dogs, other grazing wildlife, and livestock. On mixed- and tall-grass prairies, the persistent burrowing, feeding, and digging by prairie dogs can, over time, change the number and type of plants growing in the area. The grasses found on prairie dog towns are more characteristic of the short-grass prairie. With reduced competition from the tall grasses, many other plant species, especially forbs, can become established. Rainfall, soil, and other site characteristics also influence the changes that occur.



Prairie dogs may actually increase the diversity of plants in prairies because their digging and scratching activities disturbs the soil, providing excellent sites for annual grasses and forbs to become established. These plants may not persist, however, because prairie dogs usually clip or eat the plants before the seeds mature. Perennial grasses, on the other hand, are not as affected since they do not rely on seeds to produce new plants, but rather spread by roots and stems. Long-term use of an area by prairie dogs appears to promote short perennial grasses such as buffalograss and blue grama in most of the Great Plains.

## Animal associations

Historically, the immense herds of bison that roamed the Great Plains helped prairie dogs establish their towns. The bison grazed patches of the mixed-grass prairie, keeping the vegetation short enough for prairie dogs to colonize the areas. Prairie dogs alone had difficulty maintaining towns in mixed-grass prairie. The bison, however, returned occasionally to feed on the actively growing vegetation within the towns. Mule deer, elk, and pronghorns are also attracted to the highly nutritious plants that are growing in towns throughout most of the year.

Prairie dog colonies are unique areas of habitat that attract a variety of wildlife. Vacant prairie dog burrows serve as homes for cottontail rabbits and several species of small rodents. Deer mice are attracted by the annual plants that grow on the disturbed soils and grasshopper mice feed on beetles and grasshoppers that are found in prairie dog towns. Several species of birds such as horned larks, ferruginous hawks, and golden eagles frequent prairie dog towns in search of food. Three species of wildlife are very closely associated with prairie dog towns: the mountain plover, burrowing owl, and black-footed ferret. Mountain plovers prefer to nest and forage in the expanses of short grass and bare ground present in prairie dog towns.

Burrowing owls typically nest in abandoned prairie dog burrows or badger holes. They rarely feed on prairie dogs, but instead, prefer the insects and smaller mammals found nearby.

The black-footed ferret is a special inhabitant of prairie dog towns. Once thought to be extinct, it was rediscovered near Meeteetse, Wyoming, in 1981, and continues to be one of the rarest species on earth. Black-footed ferrets establish their dens in prairie dog burrows and feed almost exclusively on prairie dogs. The decline in the number of prairie dogs in the last 100 years and the isolation and disappearance of many large towns nearly led to the demise of the ferrets. More recently, outbreaks of plague in prairie dog towns and canine distemper in black-footed ferrets raised concern for the populations. Eighteen surviving ferrets were captured in the mid-1980s, and a successful captive breeding program led to the reintroduction of ferrets to the wild. If black-footed ferrets are to survive in the wild, we need to ensure that they are provided with their preferred habitat — large and healthy prairie dog towns.

## Prairie dog management

During the mid- to late-1800s, a large influx of livestock occurred across the Great Plains. Continuous grazing by cattle and sheep in the mixed- and tall-grass prairie allowed black-tailed prairie dogs to expand their population in the eastern portions of their range. Large prairie dog towns became established in eastern Kansas, Nebraska, Oklahoma, and the Dakotas. Even today, continuous and intensive grazing by livestock on rangeland encourages use by prairie dogs.

Unfortunately, the activities of prairie dogs are often viewed as being incompatible with livestock grazing, crop production, human health, and residential development. The impacts of prairie dogs on grasslands and livestock production are difficult to determine and depend on several factors, such as the number of prairie dogs, the size and age of towns, the number of livestock and other grazers present, and weather and site conditions. Prairie dogs feed on many of the same grasses and forbs that livestock do. In addition, prairie dogs often begin feeding on pastures and rangeland earlier in spring and clip plants closer to the ground than



*The  
burrowing  
owl*



*The  
black-  
footed  
ferret*



livestock. Through their persistent feeding, clipping, and other activities, prairie dogs can reduce present and future forage yields for livestock. Continuous grazing by prairie dogs, however, may maintain vegetation at a higher nutritional level. Therefore, the reduction of available forage may be offset by the improved quality of the forage in prairie dog towns. Prairie dogs also feed on and remove some plants that degrade rangeland and are unpalatable to livestock. The level of competition between prairie dogs and livestock is difficult to determine and is dependent on individual site conditions.

As settlers moved into the Great Plains and Southwest, prairie dogs were viewed as pests. Since 1900, populations of prairie dogs have been reduced significantly in some areas and eliminated in others, due largely to the cultivation of prairie soils and prairie dog control programs. Many ranchers tolerate some prairie dogs but are concerned about large prairie dog towns and expanding populations. Homeowners are concerned about the potential health risks associated with living near prairie dogs, while others are concerned about the impacts of prairie dogs on land values and development potential. Today, prairie dog control is practiced by ranchers and government agencies, although to a lesser extent than in the early- to mid-1900s. Most toxicants for prairie dog control have been removed from the market because of the hazards they presented to other wildlife and the environment. Therefore, fewer options are available to landowners that experience problems with prairie dogs. Several state and federal agencies, Native American tribes, conservation organizations, and individuals are developing plans and programs to ensure the long-term viability of prairie dog populations and yet minimize the impacts of prairie dogs on private landowners.

## Conclusion

Prairie dogs play an important role in the prairie ecosystem by creating unique patches of habitat in the expansive prairies of the American West. Their daily activities change the physical characteristics of the community, which leads to increased plant and animal diversity. Prairie dogs are a source of food for several predators, and their burrows provide homes for a variety of species, including the burrowing owl and endangered black-footed ferret. They also provide recreational opportunities for nature observers, photographers, and the sporting public. The presence of large, healthy prairie dog towns, however, is not always compatible with agriculture and other human land-use interests, but we can coexist. We should strive to conserve prairie dogs and their habitat while maintaining populations at acceptable levels. Through proper management, we can ensure that the complex community of plants and animals that are supported by and dependent on prairie dogs can continue to meet at the crossroads of the prairie.

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